CLAIMS

1. A polarization mode dispersion compensator comprising:

a polarization controller to transform polarization of an input optical signal;

a compensating device to compensate for a polarization mode dispersion of the input optical signal and output an output optical signal;

a signal quality monitor to measure quality of the output optical signal and generate a feedback signal indicating the measured quality of the output optical signal; and

a control unit to determine an amount of change of a control signal applied to the polarization controller for each feedback loop, by evaluating degree of polarization response to the control signal using a plurality of feedback signals generated in past feedback loops, change the control signal by the determined amount, and apply a changed control signal to the polarization controller.

2. The polarization mode dispersion compensator according to claim 1, wherein

the control unit obtains degree of polarization from each of the plurality of feedback signals, compares a difference between a maximum and a minimum of the obtained degree of polarization with a threshold value, and increases the amount of change when the difference is greater than the threshold value.

3. The polarization mode dispersion compensator according to claim 2, wherein

the control unit obtains degree of polarization from a current feedback signal, compares the obtained degree of polarization with the maximum and the minimum of degree of polarization, and decreases the amount of change when the obtained degree of polarization is smaller than the maximum and greater than the minimum and the difference is smaller than the

threshold value.

4. The polarization mode dispersion compensator according to claim 1, 2, or 3, wherein

the control unit marks change of the control signal leading to a worse compensation performance and skips a control step with the marked change in one or more of succeeding feedback loops.

5. The polarization mode dispersion compensator according to claim 1, 2, or 3, wherein

the polarization controller includes birefringent elements controllable like a concatenation of one or more rotatable waveplates each of which is with a fixed amount of retardance.

6. The polarization mode dispersion compensator according to claim 5, wherein

the birefringent elements are realized by multiple three-electrode sections on a $LiNbO_3$ substrate, each of which operates like a rotatable waveplate controlled by voltages applied to electrodes.

7. The polarization mode dispersion compensator according to claim 1, 2, or 3, wherein

the polarization controller includes birefringent elements controllable like a concatenation of one or more rotatable waveplates whereby an amount of retardance is adjustable.

8. The polarization mode dispersion compensator according to claim 1, 2, or 3, wherein:

the polarization controller includes birefringent elements controllable like a concatenation of one or more rotatable waveplates; and

the control unit marks a rotation direction of one of the waveplates leading to a worse compensation performance and skips a control step with change of a control signal for the marked direction in one or more of succeeding feedback loops.

9. The polarization mode dispersion compensator according to claim 1, 2, or 3, wherein

the compensating device is an optical element with a fixed amount of differential group delay.

10. The polarization mode dispersion compensator according to claim 1, 2, or 3, wherein

the compensating device is an optical element with a variable and adjustable amount of differential group delay.

11. The polarization mode dispersion compensator according to claim 10, wherein

the control unit determines an amount of change of the differential group delay for each feedback loop by evaluating a past trend of changes of the differential group delay of the compensating device.

12. The polarization mode dispersion compensator according to claim 11, wherein

the control unit checks whether the differential group delay shows one of a continuous decrease and increase, and increases the amount of change of the differential group delay when the differential group delay shows the one of the continuous decrease and increase.

13. The polarization mode dispersion compensator according to claim 1, 2, or 3, wherein:

the signal quality monitor includes a polarimeter which measures components of a Stokes vector and generates a feedback signal indicating the components of the Stokes vector; and

the control unit obtains degree of polarization using the components of the Stokes vector.

14. A control unit for a polarization mode dispersion compensator including a polarization controller to transform polarization of an input optical signal, a compensating device to compensate for a polarization mode dispersion of the input optical signal and output an output optical signal, and a signal quality monitor to measure quality of the output optical signal and generate a feedback signal indicating the measured quality of the output optical signal, comprising:

a control circuit to determine an amount of change of a control signal applied to the polarization controller for each feedback loop, by evaluating degree of polarization response to the control signal using a plurality of feedback signals generated in past feedback loops, change the control signal by the determined amount, and apply a changed control signal to the polarization controller.

15. A polarization mode dispersion compensating method comprising:

transforming polarization of an input optical signal through a polarization controller;

compensating for a polarization mode dispersion of the input optical signal through a compensating device to generate an output optical signal;

measuring quality of the output optical signal to generate a feedback signal indicating the measured quality of the output optical signal;

determining an amount of change of a control signal applied to the polarization controller for a current feedback loop, by evaluating degree of polarization response to the control signal using a plurality of feedback signals generated in past feedback loops; and

changing the control signal by the determined amount and

applying a changed control signal to the polarization controller.

16. The polarization mode dispersion compensating method according to claim 15, wherein

the determining compares a difference between a maximum and a minimum of degree of polarization obtained from the respective feedback signals, with a threshold value, and increases the amount of change when the difference is greater than the threshold value.

17. The polarization mode dispersion compensating method according to claim 16, wherein

the determining obtains degree of polarization from a current feedback signal, compares the obtained degree of polarization with the maximum and the minimum of degree of polarization, and decreases the amount of change when the obtained degree of polarization is smaller than the maximum and greater than the minimum and the difference is smaller than the threshold value.

18. The polarization mode dispersion compensating method according to claim 15, 16, or 17, further comprising:

marking change of the control signal leading to a worse compensation performance; and

skipping a control step with the marked change in one or more of succeeding feedback loops.